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ABSTRACT

In 1997-98, all Acadia University (Wolfville, Nova Scotia, Canada) freshman undergraduate students were required to lease IBM laptop computers for use in their programs. With corporate support from IBM, the campus was wired so that students could have cross-campus and off-campus access to a host of network software as well as the World Wide Web. The Acadia University laptop project, coined the "Acadia Advantage" (AA) was a first in Canada. This fully-wired campus and student access to laptop computers allowed for innovative approaches to using computers in classroom instruction. An electronic portfolio assessment strategy was implemented in both Secondary and Elementary Science Education courses for Pre-service Teacher candidates. A survey of the impact of this electronic environment on students' attitudes reveals that students continue to require significant introduction to the technology in order to overcome the associated anxiety. In a 10- to 13-week course, such a time commitment to the technology may not be reasonable. In future offerings of the course, a preliminary workshop will be offered. (Contains 13 references.) (AEF)

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ELECTRONIC PORTFOLIOS IN PRE-SERVICE SCIENCE EDUCATION

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Electronic Portfolios in Pre-service Science Education

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Abstract

The Acadia University laptop project coined the "Acadia Advantage"(AA) is a first in Canada. A fully-wired campus and student access to laptop computers has allowed for innovative approaches to using computers in classroom instruction. An electronic portfolio assessment strategy was implemented in both Secondary and Elementary Science Education courses for Pre-service Teacher candidates. A survey of the impact of this electronic environment on student's attitudes has revealed that students continue to require significant introduction to the technology in order to overcome the associated anxiety. In a ten to thirteen week course such a time commitment to the technology may not be reasonable.

Electronic Portfolios in Pre-service Science Education

The Electronic Environment

In the fall of 1996, a limited number of Acadia University students were involved in the pilot project involving laptop computers. This academic year (1997-98) all Acadia University freshman undergraduate students were required to lease IBM laptop computers for use in their programs bringing the total number of students with laptops to approximately fourteen hundred. With corporate support from IBM, the campus has undergone extensive rewiring such that professors can integrate computer use in the delivery of undergraduate courses. Students have cross-campus access and off-campus access to a whole host of network software as well as the world wide web. This project the first of its kind in Canada has been coined "The Acadia Advantage"(AA).

The professional development of some one hundred forty faculty has been undertaken by the Acadia Institute for Teaching and Technology (alias Sandbox). This group has had the responsibility to work with faculty to create innovative applications of computers to the university classroom in all subject areas. One of their greatest successes has been the Acadia Courseware Management Environment (ACME). This software has allowed faculty and students to access course outlines and schedules as well as discussion groups and online testing in a web page based framework via Netscape.

At the School of Education all classrooms have been rewired such that courses of thirty to forty students can access the network as well as power through recessed sub-floor jacks. These classrooms are particularly well-equipped for instructional presentations. Facilities include a digital projector, video monitor, audio system, video cassette recorder, an opaque

projection panel and electronically-controlled wall screens all of which are accessible through an ergonomically-designed laptop docking station.

All students arrive to class with the same IBM Pentium 133 MHz laptop computer with 1.3 GB hard drive and twenty-four MB of RAM. These computers also have an internal CD ROM and external 3.5 floppy drive. The decision was made in the Acadia-IBM partnership that the same computer would be used by all students and that students could not purchase their own prior to arrival on campus. This has allowed for facile repairs due to readily accessible parts. Via this commitment the Acadia Computer Support Centre team, though relatively small, is able to maintain computer hardware in a very efficient manner. Professors have been issued identical computers for use in their courses.

Electronic Portfolios As An Assessment Tool

From year to year the Science Education component of Pre-service Teacher Education at Acadia involves approximately sixty elementary students and fifteen secondary students. With the AA project in place, all students attend class with an IBM laptop computer which they connect to the network.

The application of computer-based technology to classroom settings has the potential to enhance learning (Massy & Zemsky, 1995; Padron & Waxman, 1996; Tosteson, 1996). The computer application explored in these courses was that of a modified electronic portfolio. Electronic portfolios have been successfully utilised in courses ranging from public school settings to graduate courses at universities and colleges. Various strategies have been implemented and assessed (Moersch & Fisher, 1995; Doty & Hillman, 1997; Jackson, 1997; Murphy, Foote, McFarland & Erwin, 1997; Milligan & Robinson, 1997). The use of the electronic portfolio in these Science Education courses represents a departure from a more

traditional sense (Danielson & Abrutyn, 1997) of the portfolio definition to use of the electronic portfolio as a class work organiser. The rationale for experimenting with this assessment tool came from dissatisfaction with other approaches being used on campus namely published web pages.

An assessment strategy used in courses at Acadia with varying degrees of success has incorporated web page design. Students have assembled and net-published homepages in individual courses and posted personal information and their assignment work to these pages for professors and classmates to access. The initial reaction to this format of submitting assignment work has been mixed. Students are not always in favour of publishing their work in an open forum and sometimes would rather only their individual professors read and assess their contributions.

In my courses electronic portfolios were assembled as an alternative to the net-published format outlined above. Working from a course outline, students created on a single disk (1.44 MB) a table of contents. Students added assignment and class work headings to their page as the term progressed. In an on-going process, these headings were then linked to their class work which had been saved on that same disk. Some of the headings included collections of their peers work. The availability of an e-mail distribution list for the class allowed students to exchange their work via attachments.

The work of Adrianson and Hjelmquist (1993) has suggested that in order for students to be successful in applying computer technology they must be comfortable with the hardware and software. Approximately one three hour class (out of a total of 10) was devoted solely to developing a "comfort level" with the software system. The approach necessitated that students be familiar with Netscape Communicator Composer software and therefore a series of tutorial

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sessions was undertaken. In Microsoft Word 97 students generated documents which included text and graphics. These documents were then saved in a folder with HTML extensions. In Netscape Communicator Composer students prepared a table of contents page with links to these HTML documents.

Science Education Electronic Portfolios

The traditional portfolio allows students to choose which work best demonstrates their competence (Reynolds, 1991; Reynolds & Barba, 1996). The portfolio framework outlined above retains some of this quality in that students firstly introduce the work in progress by outlining their backgrounds and attitudes. They proceed to add a diverse cross section of their work. Students followed a course outline of items to be included in their portfolio. Examples of the assignment work organised and presented in this fashion are outlined in Table 1. The entry components chosen by the professor were intended to allow for students to express their competence using a variety of intelligence modes. The next step in this ongoing study would be to introduce multimedia as an option for this expression. Only then could this format truly attempt to address multiple intelligence's (Armstrong, 1994). The students closed their portfolios with a term paper which was to provide reflection on the course contents. Captured samples of student web pages are shown in Figure 1 and Figure 2.

What Did The Students Think?

In an effort to judge student's attitude towards this classroom application of computers, a survey was conducted with seventy five Science Education students.

In this sample seventy-six percent of students said they were quite intimidated with the technology and the prospect of assimilating their own web page. These same students indicated that they became more confident as the term progressed. Approximately forty-five percent of all

students felt they needed additional instruction in the use of the web page software at the beginning of the course. Sixty percent of students noted that peers were particularly helpful in assembly of their portfolio. As an aside, students frequently indicated that their familiarity with file management improved.

Perhaps the most resounding support (90%) was for the electronic exchange of student materials in building a database of ideas. In the end students did not indicate a preference (50:50) for this electronic assessment format over the submission of class work as a hard paper copy. They attributed this to the extra work required over and above printing out their assignments.

Next Time Round!

It is clear that in order for this electronic approach to be successful with all students, a considerable period of time must be devoted to removing intimidation associated with the technology. In future offerings of the course a preliminary workshop will be offered. Students seem to be willing to experiment with these approaches providing it doesn't add to their course work load.

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Footnotes

[1]These assessment items were exchanged between classmates via e-mail attachments and appeared on each student's portfolio thereby providing a resource base for use in the future

[2]In the Secondary Science Education course students were involved in three independent electronic discussion groups. These discussions were captured as Word 97 documents and added to the Electronic Portfolios.

Table 1

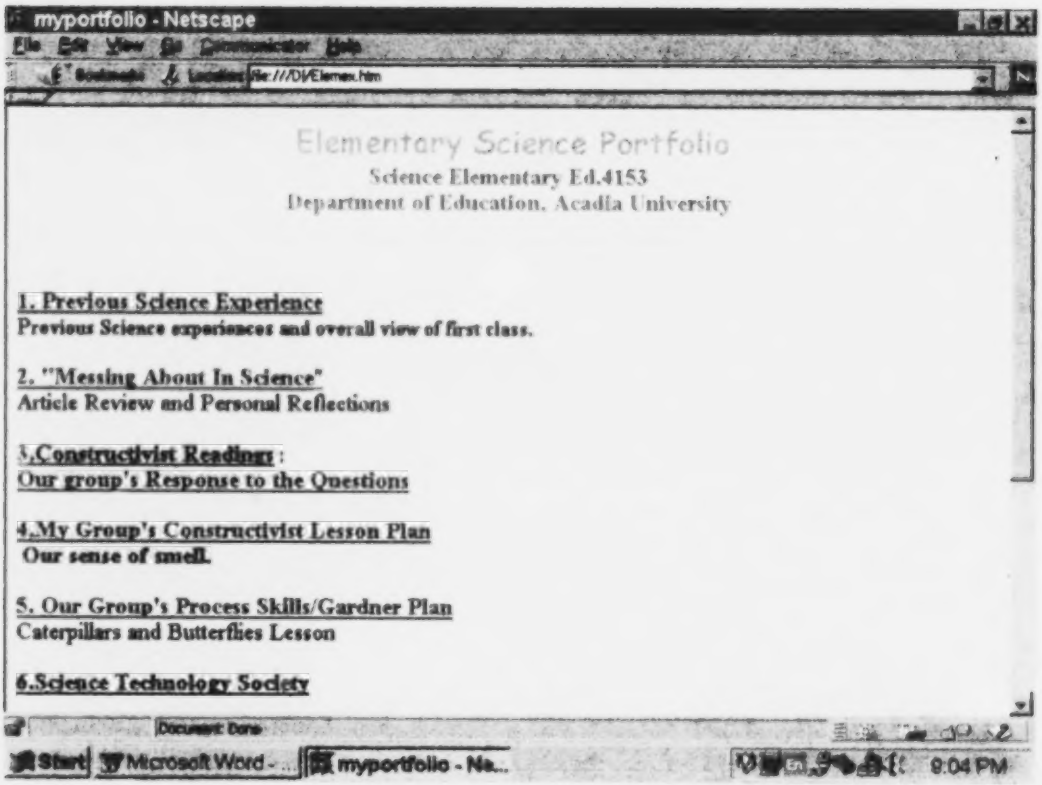
Portfolio Items

Introductory Philosophy of Science Education
Literature Reviews
[1]Constructivist Lesson Plans
Concept Maps
Science, Technology and Society (STS) Curriculum Webs
[1]Lesson Plans Demonstrating The Embedding of Process Skills
[1]Role Play Lesson Plans
[1]Music and Literature in Science
[1]Demonstration Outlines
Internet Resources
[2]Discussion Group Capture
Term Paper "The Impact of This Course On My Ideas About Science Education"

Figure Captions

Figure 1. Student web page (Elementary Science).

Figure 2. Student web page (Secondary Science).


myportfolio - Netscape
File Edit View Go Communicator Help
Bookmarks Location: file:///D|/Elemex.htm
Elementary Science Portfolio
Science Elementary Ed.4153
Department of Education, Acadia University
1. Previous Science Experience
Previous Science experiences and overall view of first class.
2. "Messing About In Science"
Article Review and Personal Reflections
3.Constructivist Readings :
Our group's Response to the Questions
4.My Group's Constructivist Lesson Plan
Our sense of smell.
5. Our Group's Process Skills/Gardner Plan
Caterpillars and Butterflies Lesson
6.Science Technology Society
Document Done
Start
Microsoft Word - ...
myportfolio - Ne...
9:04 PM

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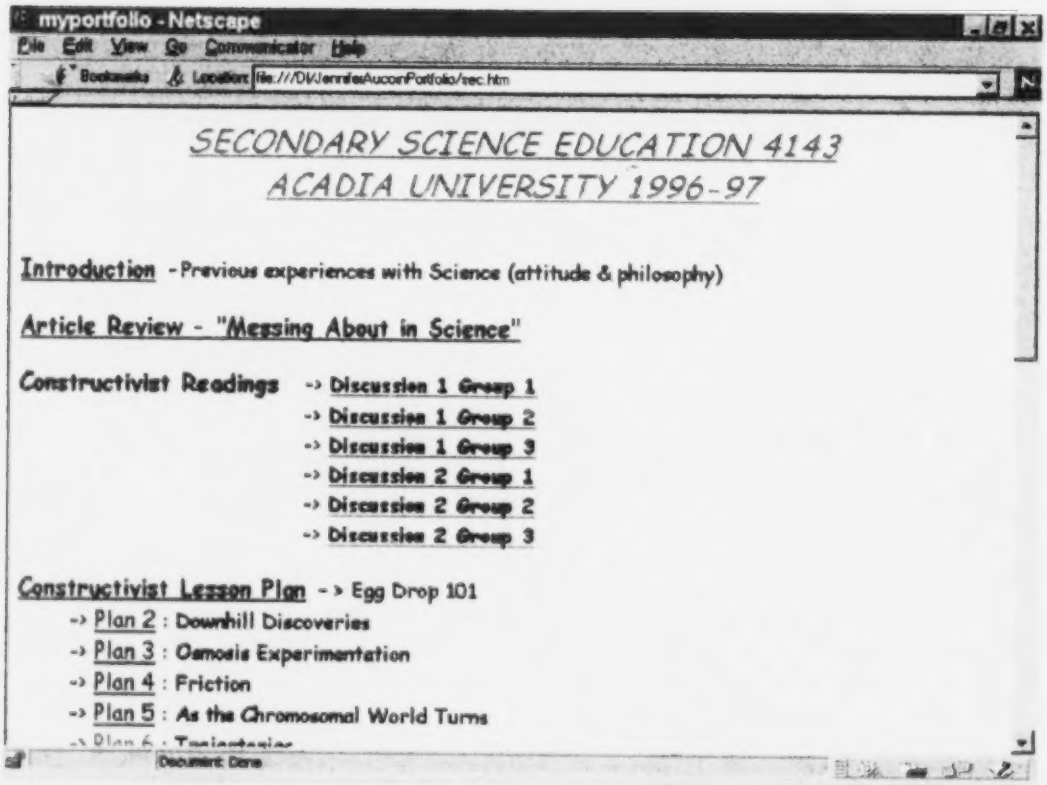
myportfolio - Netscape
File Edit View Go Communicator Help
Bookmarks Location: file:///D|/Jennifer/Acadia/Portfolio/sec.htm
SECONDARY SCIENCE EDUCATION 4143
ACADIA UNIVERSITY 1996-97
Introduction - Previous experiences with Science (attitude & philosophy)
Article Review - "Messing About in Science"
Constructivist Readings -> Discussion 1 Group 1
-> Discussion 1 Group 2
-> Discussion 1 Group 3
-> Discussion 2 Group 1
-> Discussion 2 Group 2
-> Discussion 2 Group 3
Constructivist Lesson Plan - > Egg Drop 101
-> Plan 2 : Downhill Discoveries
-> Plan 3 : Osmosis Experimentation
-> Plan 4 : Friction
-> Plan 5 : As the Chromosomal World Turns
Document: Done

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